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manner with other points until the line  $C o G$  (Fig. 7) and  $C L o G$  (Fig. 8) is obtained.

To find the covering of the frustum of a cone, the section being made by a plane perpendicular to the axis :

Let  $A C E F$  (Fig. 9) be the generating section of the frustum. On  $A C$  describe the semicircle  $A B C$ , and produce the sides  $A E$  and  $C F$  to  $D$ . From the centre  $D$ , with the radius  $D C$ , describe the arc  $C H$ ; and from the same centre, with the radius  $D F$ , describe the arc  $F G$ : divide the semicircle into any number of equal parts, and run the same divisions along the arc  $C H$ ; draw the ordinates to the semicircle through the points of division, at right angles to, and meeting  $A C$ ; and from the points  $o n m$ , etc., where these ordinates cut the line  $A B$ , draw lines to the point  $D$ ; and from the last division in the arc  $C H$  draw also a line to the point  $D$ ; then shall  $C H G F$  be half the development of the covering of the frustum  $A C F E$ .

To find the covering of the frustum of a cone the section being made by a plane not perpendicular to the axis :

Let  $A C F E$  (Fig. 10) be the frustum. Proceed as in the last problem to find the development of the covering of the semicone: then, to determine the edge of the covering on the line  $E F$ . From the points  $p q r s t$ , etc., draw lines perpendicular to  $E F$ , cutting  $A C$  in  $y x w v u$ ; and the length  $u t$  transferred from 1 to  $a$ ,  $v s$  transferred from 2 to  $b$ , and so on, will give  $a b c d e G$ , points in the edge of the covering.

We have now arrived at that stage where we can bring before the student, practical examples of works in carpentry and joinery, and in our next we intend to do so, giving such lines as may be necessary to give a clear idea of how the work should be executed.

If the reader has followed the papers on this subject closely, he will have no difficulty in comprehending what follows.

## The Sectorian System of Hand-Railing.

EIGHTH PAPER.

Plate 58.

SECTION 2.—This section shows a stair, with winders in the quadrant, with a radius of two feet in the turning. Where the space is sufficient, a very imposing structure can be raised, giving character and effect to all the surroundings if all are in keeping, which of course, in such a building, would be the case.

Suppose the newel to be twelve inches at the base, the rail six inches wide, well moulded—the balusters three inches in diameter at the base, steps four or five feet long, the ends handsomely finished with nosings at least one and a half inches thick, the string faced with

a handsome bracket, then a large niche in the angle, with a fine piece of statuary as an ornament. I know of no conception in character to equal it. The grandest sort of stairs can be built after this plan.

Fig. 1 shows the plan with the quarter wreath all in one piece, by working from the tangents  $a$  and  $b$ . If it is found desirable to have the wreath in two pieces, then the dotted lines show the angle of the tangents to be used. The height of two and a half instead of five risers will be the height for each piece.

Having laid down the plan, proceed to obtain the whole length wreath. Take the bevel and obtain the tangents from the sector, as applied at  $a, b$ , Fig. 1, on the rake, and draw the lines,  $a, b$ , Fig. 2; get the length, and lay off width of rail, to describe circle of wreath; stick pins at the points  $c, d, e, f$ , and with long blade bevel, each blade pressing against the pins, with pencil in the angle, strike the circle,  $g, h$ , Fig. 2, to equal  $g, h$ , Fig. 1.

Fig. 3 is the lower wreath, and procured as before described.

Fig. 4 shows the ramp from flyer to winder.

Section 2 shows the plan of the commencement of a grand stairway intended for a large hall of a first-class house.

Fig. 1 is the plan of newel, cap, curved steps and risers, balusters, etc. I have not given the mode of curving the risers, supposing that any one sufficiently skilled to construct a stairway would certainly know how to bend a riser.

Fig. 2 is the starting wreath-piece, and is obtained in the way given in preceding notes, and needs no further explanation on this plate.

Fig. 3 is a side view of Fig. 1, showing section of cap and elevation of rail. The falling moulds for the wreath are obtained as laid down in preceding plates, to which reference must be had for further instruction.

To obtain the spring and plumb bevels, resort must be had to the sector, and proceed as laid down in former plates, having one leg of tangent bevel horizontal, and the other on a rake of the flyer; then apply the small bevel in the usual way on both leaves of the sector. As it will be seen, that by one leg being placed horizontal and the other on the rake of the flyer the spring and plumb are not the same angle.

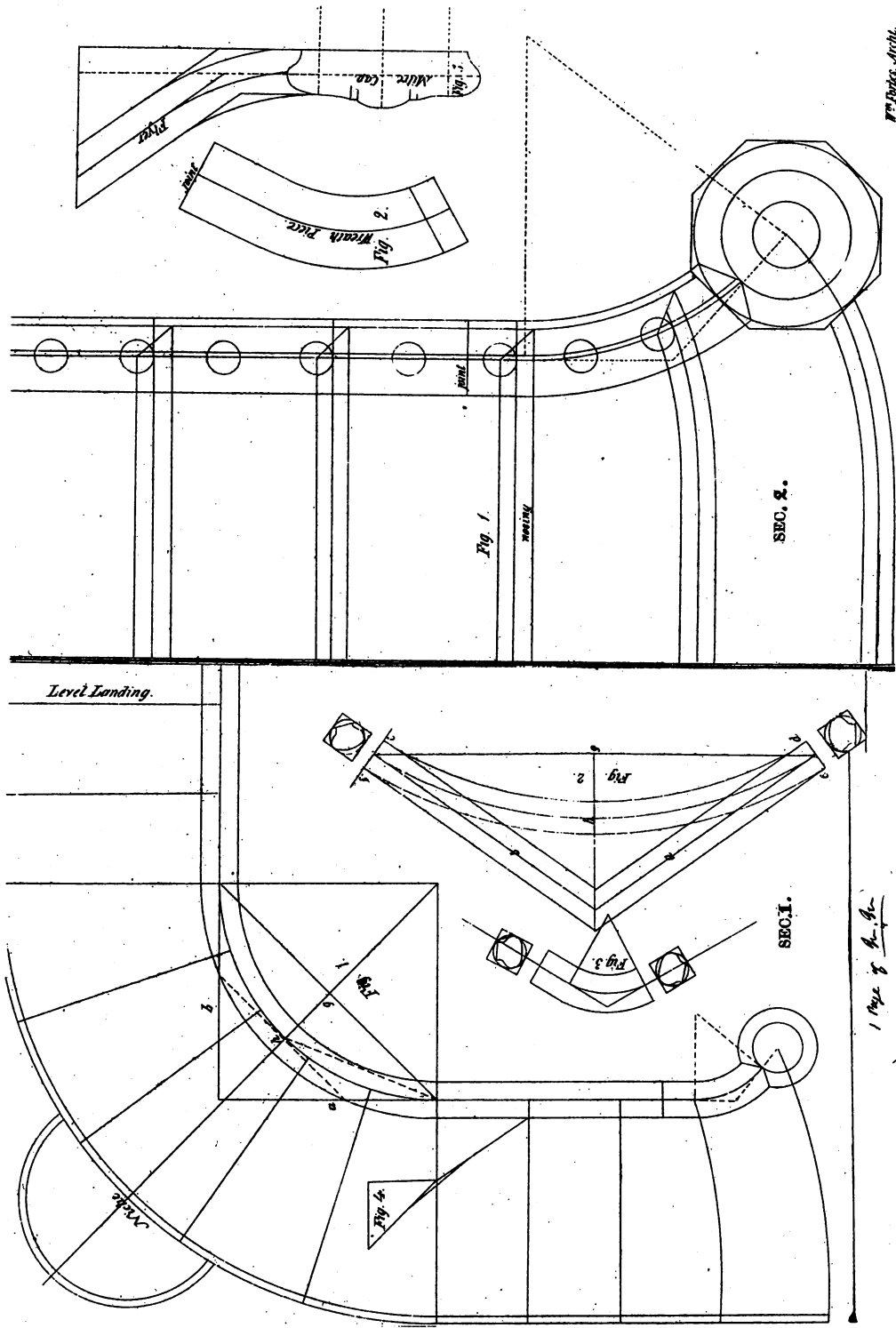
## Correspondence.

WE invite communications from our readers in matters connected with the trades we represent. Be brief, courteous, and to the point.

*Editor of the Wood-Worker:*

THE eleven packages received all right. I am well satisfied with them. The WOOD-WORKER is so good a publication that I would

PLATE 58.



THE SECTORIAL SYSTEM OF HAND-RAILING.